Protect and Restore Habitat; Tucannon Watershed

Annual Progress Report

(January, 2011 through December 2012)

Northwest Power Planning Council Project #2008-202-00

Contract #'s:

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Bonneville Power Administration

Prepared By:

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Confederated Tribes Umatilla Indian Reservation

Department Natural Resources Fish and Wildlife Program

CONFEDERATED TRIBES UMATILLA INDIAN RESERVATION

BONNEVILLE POWER ADMINISTRATION

Confederated Tribes of the Umatilla Indian Reservation

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Abstract:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Tucannon Fisheries Habitat Project (TFHP) is an ongoing effort to protect, enhance, and restore riparian and in stream habitat for the natural production of anadromous salmonids in the Tucannon River Basin, Southeast Washington. Fish passage, channel characteristics, habitat diversity, floodplain confinement, temperature, turbidity, flow quantity, and lack riparian vegetation have been identified as the key limiting factors to ESA Listed salmonids as described in the CTUIR River Vision document (2005). During the 2009-2012 Fiscal Year (FY) reporting period (August 4, 2009-December 31, 2012), general project activities focused on improving in stream and riparian habitat complexity, migrational passage, and restoring natural channel morphology and floodplain function. Fisheries habitat enhancement projects were implemented on Cummings Creek, Russel Springs Creek, Hartsock Springs Creek, Pataha Creek, and the Tucannon River by CTUIR. Specific restoration strategies included: (1) rectifying fish passage at four locations; (2) adding 250 pieces of woody debris and 750 boulders to the channel to improve habitat complexity; (3) planting 10,000 trees and seeding 2,500 pounds of native grasses; (4) planning activities for a large woody debris project scheduled for implementation planned for the upper Tucannon River in 2014: (5) and establishment of baseline and ongoing monitoring and maintenance activities to retain and improve function and appearance of project sites. Project activities and objectives were based on a variety of fisheries monitoring techniques and habitat assessments used to determine existing conditions and identify factors limiting anadromous salmonid abundance in accordance with common language shared between regional Subbasin Plans and CTUIR's River Vision document and First Foods policy to adhere to mission statement guidance. Project evaluation strategies included aquatic habitat and fish inventories, in addition to establishment of photo points to gage effectiveness and inspire timely adaptive management actions toward increasing probability of project success over time. Proper selection of the most effective site-specific habitat restoration plan, taking into consideration the unique characteristics of each project site, including the consideration of restrictive parameters was of paramount importance. CTUIR also participated in the planning and implementation process of several additional project opportunities with cooperating resource management entities. Much emphasis was dedicated to public relations and reporting responsibilities through oral presentations in a variety of professional forums across several states. Content was focused on highlighting project success.

Introduction:

The ancestors of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have hunted and gathered food and fished numerous rivers and streams of the Pacific Northwest for thousands of years. They depended upon anadromous fish for subsistence and trade. The indigenous people of the CTUIR still rely on natural resources from several watersheds located within areas of traditional use to provide them with a multitude of life essentials.

CTUIR's right to fish in its historical fishing places was acknowledged in the Treaty of 1855 that stated: "the exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians, and at all other usual and accustomed stations…" (Treaty of 1855, Articles of Agreement, Article 1, page 3). Decreased salmonid abundance has significantly impacted the livlihood of the Tribal community and altered their way of life.

Overfishing, sweeping changes to rivers and streams, and policies that changed the landscape have endangered salmon and created a "salmon crisis" (Montgomery 2003). It is the challenging duty of the CTUIR Tucannon Anadromous Fisheries Habitat Project (TFHP) to restore and sustain healthy conditions of local watersheds to both assist in salmon recovery and ensure they provide adequate quantities of sustainable natural resources to satisfy the CTUIR's needs and preserve opportunities for traditional ways of life.

The Bonneville Power Administration (BPA) funds the CTUIR and other Pacific Northwest Tribes to restore salmonid habitat as part of its mitigation activities due to the harmful effects and loss of habitat caused by the massive Columbia River hydroelectric dams. The CTUIR UAFHP, #2008-202-00, funded by BPA through the Northwest Power Planning Council (NPPC) (renamed Northwest Power and Conservation Council in 2003 [NWPCC]) Fish and Wildlife Program, is an ongoing project initiated by CTUIR in 2008. The TAFHP is part of the broader effort by Columbia River Tribes to protect and restore salmonid populations and to preserve community traditions that honor and celebrate the CTUIR's ties to this vital food source. The CTUIR is guided in its habitat restoration activities by objectives based on a variety of fisheries monitoring techniques and habitat assessments used to determine existing conditions and identify factors limiting anadromous salmonid abundance in accordance with common language shared between regional Subbasin Plans and CTUIR's River Vision document and First Foods policy to adhere to mission statement guidance. In order to meet the Project goal and objectives, restoration designs were developed that address limiting factors while improving riverine habitat for ESA-listed salmonids. Restoration actions will be guided by the CTUIR River Vision (Jones et al. 2008). The CTUIR River Vision seeks to promote a dynamic river and floodplain system with natural variability, address ecological processes rather than localized manipulations that may not take into account the causes of the degradation, and plan projects in relation to larger-scale watershed impacts. Table 1-1 provides the linkage from limiting factors to restoration objectives and River Vision Touchstones, and the associated metrics that can be evaluated for Project designs and post-implementation effectiveness monitoring.

Table 1-1. Limiting Factors, Associated Restoration Objectives, River Vision Touchstones, and Evaluation and Monitoring Metrics

Limiting Factors (NOAA equivalent)	Restoration Objective	River Vision Touchstone	Metrics
In-Channel Characteristics (6.2: Channel Structure and Form: Instream Structural Complexity)	• Restore geomorphic processes • Increase habitat diversity in the channel • Improve habitat quantity and quality • Increase instream habitat structures • Arrest channel downcutting through structure installation	Primary: Aquatic Biota Secondary: Geomorphology	Channel geometry (bankfull width, bankfull depth, width/depth ratio), longitudinal profile
			Sinuosity (Lc/Lv)
			LWD Counts
			Pool frequency or spacing
			Percent pools
			Residual pool depth (dmax/dtail)
Floodplain Connectivity (5.2: Peripheral and Transitional Habitats: Floodplain Condition) **Riparian** (4.1: Riparian condition: Riparian Vegetation)	• Increase floodplain and secondary channels • Increase channel sinuosity • Add large wood to channels and floodplains to promote roughness, deposition, and vegetation establishment • Increase floodplain cross-sectional area • Restore riparian vegetation	Primary: Connectivity, Geomorphology Secondary: Riparian Vegetation	Percent of floodplain disconnected
			Entrenchment ratio or confinement ratio (Wfp/Wbf)
			Floodplain relative elevation
			Channel Complexity Index
			Size, density, and cover of native or site appropriate species
Sediment (7.2: Sediment Conditions: Increased Sediment Quantity)	• Restore geomorphic processes • Establish equilibrium conditions • Reduce fine sediment supply • Increase substrate quality	Primary: Geomorphology Secondary: Aquatic Biota	Threshold grain size and transport rate
			Meander belt width
			Aggradation rate

Several previous studies have identified the preferred types of restoration activities for addressing the limiting factors in the Project areas. Results from a geomorphic assessment commissioned by the Columbia Conservation District (CCD) (Anchor 2011) and an Ecosystem Diagnosis and Treatment (EDT) analysis (CCD 2004, Appendix J) concluded that increased pools and LWD were needed to address the primary limiting factor of habitat quantity. The following recommendations for restoration activities, included in Anchor (2011), are based on the restoration framework actions developed by Roni et al. (2002):

-Protect and maintain natural processes.

-Connect disconnected habitat.

-Address anthropogenic, confining infrastructure impairing natural processes/connectivity.

-Restore riparian processes and canopy. Utilize best forest management practices.

-Improve in-stream habitat. Add LWD to force pools and maintain channel complexity.

The primary goal of the TFHP is to protect, enhance, and restore salmonid habitat and abundance in the Tucannon watershed. Habitat enhancement activities are designed to improve aquatic and riparian habitat resulting in an increase in viable populations of focal species and secondary species of fish and wildlife in the Tucannon River watershed. The mainstem Tucannon River and tributaries provide spawning, rearing, and migrational habitat for four Endangered Species Act- (ESA) listed (Threatened) salmonids: Snake River summer steelhead- (*Oncorhynchus mykiss*), spring and fall chinook salmon (*O. tshawytscha*), and Columbia River bull trout (*Salvelinus confluentus*). The Tucannon River represents the most downstream, tributary-population in the Snake River watershed and is also the lowest elevation drainage where Snake River spring chinook salmon. The population was in decline throughout the 1980's, and reached a critical low in the mid 90's, when the number of wild adults plummeted to as few as three naturally-produced individuals.

Secondary objectives address other preferred species of traditonal importance to CTUIR such as; resident redband rainbow trout, Pacific lamprey, mountain whitefish, fall chinook, coho salmon, and freshwater mussels.CTUIR is also engaged in activities to enhance habitat for Human activities in the Tucannon River subbasin have transformed the river from a branching channel with a connected, diverse riparian zone, to a moderately incised and confined single-thread channel with a degraded and disconnected riparian zone. These impacts have resulted in severely reduced in-stream habitat complexity, pool frequency, and floodplain connectivity, which limits adequate spawning and rearing habitat for the ESA listed species. Additionally, much of the surrounding watershed burned in the School Canyon Fire from August 5-19, 2005 which impacted over 52,000 acres of forest and riparian areas along the Tucannon River. The fire was caused when a tree top was blown over by the wind and came into contact with a powerline that serves one customer, the Camp Wooten Environmental Learning Center. Some of the most severe fire damage occurred in Hixon Canyon, located in prime spring chinook salmon habitat the upper Tucannon River Watershed near RM 45. The Columbia Complex Fire was caused by lightening strike on August 22 and ignited until September 30, 2006 after burning 110,000 acres. The Hubbard fire burned 11,500 acres until being extinguished on August 29, 2010. Because of this, the Tucannon River offers significant potential for listed species population recovery and enhancement if the in-stream habitat and floodplain conditions are improved.

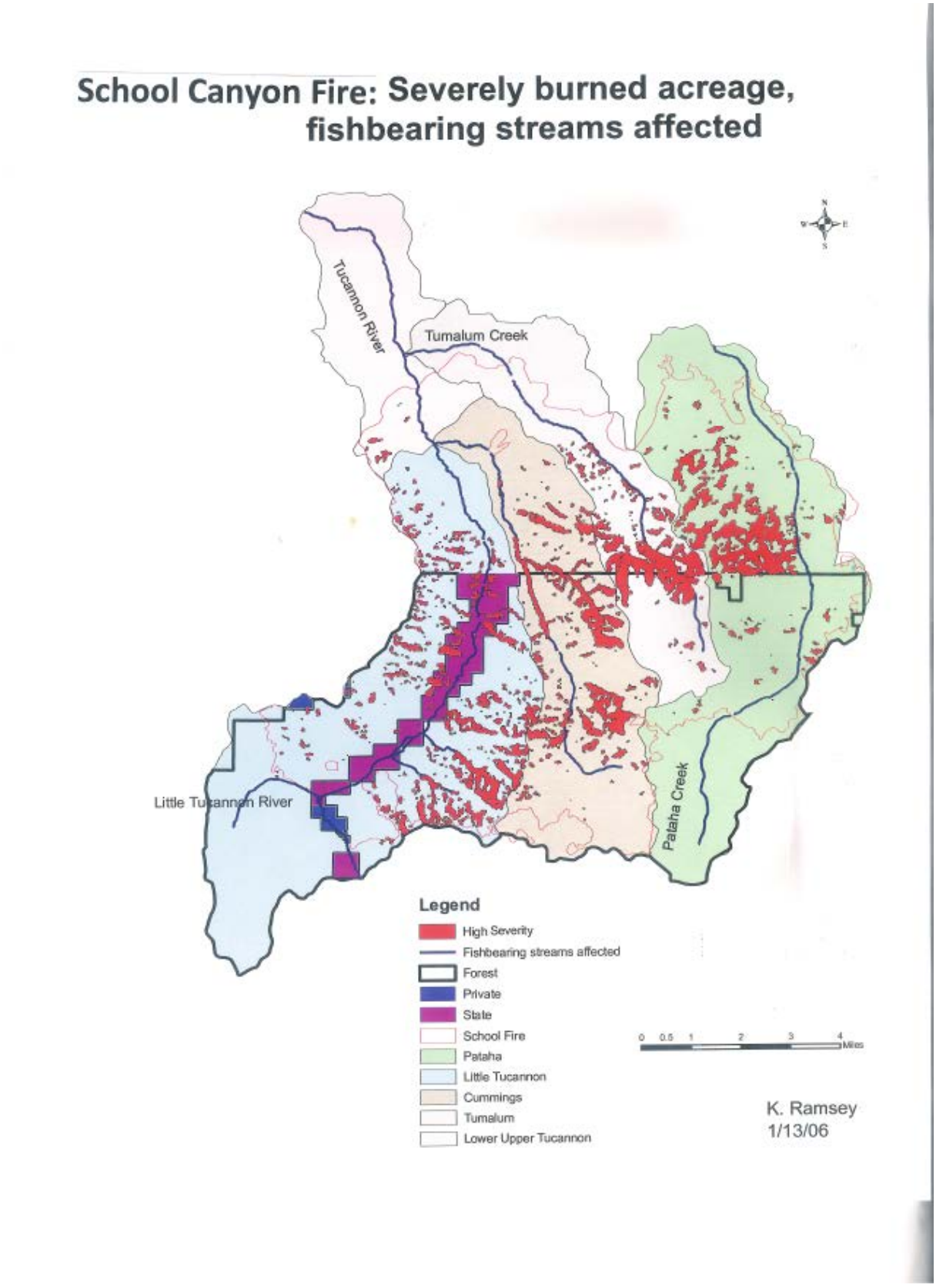

Figure. Map of 2005 School Canyon Fire & associated burn severity classification (Ramsey, USFS)

Figure . Tucannon River RM 45 during School Canyon fire near Hixon Canyon, summer 2005

The Tucannon River is a tributary of the Snake River and is located in southeastern Washington. The main channel is approximately 62.3 miles long and drains watershed area that encompasses 502 square miles in Columbia and Garfield Counties. Elevation varies from 6,400 feet above sea level in the headwaters near the town of Pomeroy, Washington to 540 feet at the confluence with the Snake River near Starbuck, Washington (Figure). Peak flow rates were estimated for the 1.05- (approximate bank full), 2-, 10-, 25-, 50- and 100-year flood frequency for the upper Tucannon River near RM 47 using the unit-discharge gage-transfer method outlined in Sumioka et al. (1998). Peak flow estimates for the 2-year recurrence interval discharge ranged between 4,995 and 5,541 cubic feet per second (cfs) (Tetra Tech, 2013). Flows recorded at RM 8 show a minimum of 15 cfs, a mean of 170 cfs, and maximum of 7,980 cfs. The Tucannon River originates in the Blue Mountains, located in the Umatilla National Forest, and flows generally northwest to its confluence with the Snake River near Starbuck, Washington (Figure). The Tucannon joins the Snake River approximately 3 miles upstream from Lower Monumental Dam and two miles downstream from Little Goose Dam. Having the confluence inundated by slack water between two major dams is theorized to cause migrational homing issues for fishes returning from the Pacific Ocean seeking suitable spawning grounds in their natal streams. Extremely high straying rates (up to 55%) of adult salmonids have been documented in various research studies. Several major tributaries drain into the main stem including, Pataha Creek, Tumalum Creek, Cummins Creek, Little Tucannon, and Panjab Creek. A full description of the basin is provided in the Tucannon River Geomorphic Assessment and Habitat Restoration Study (Anchor April, 2011).

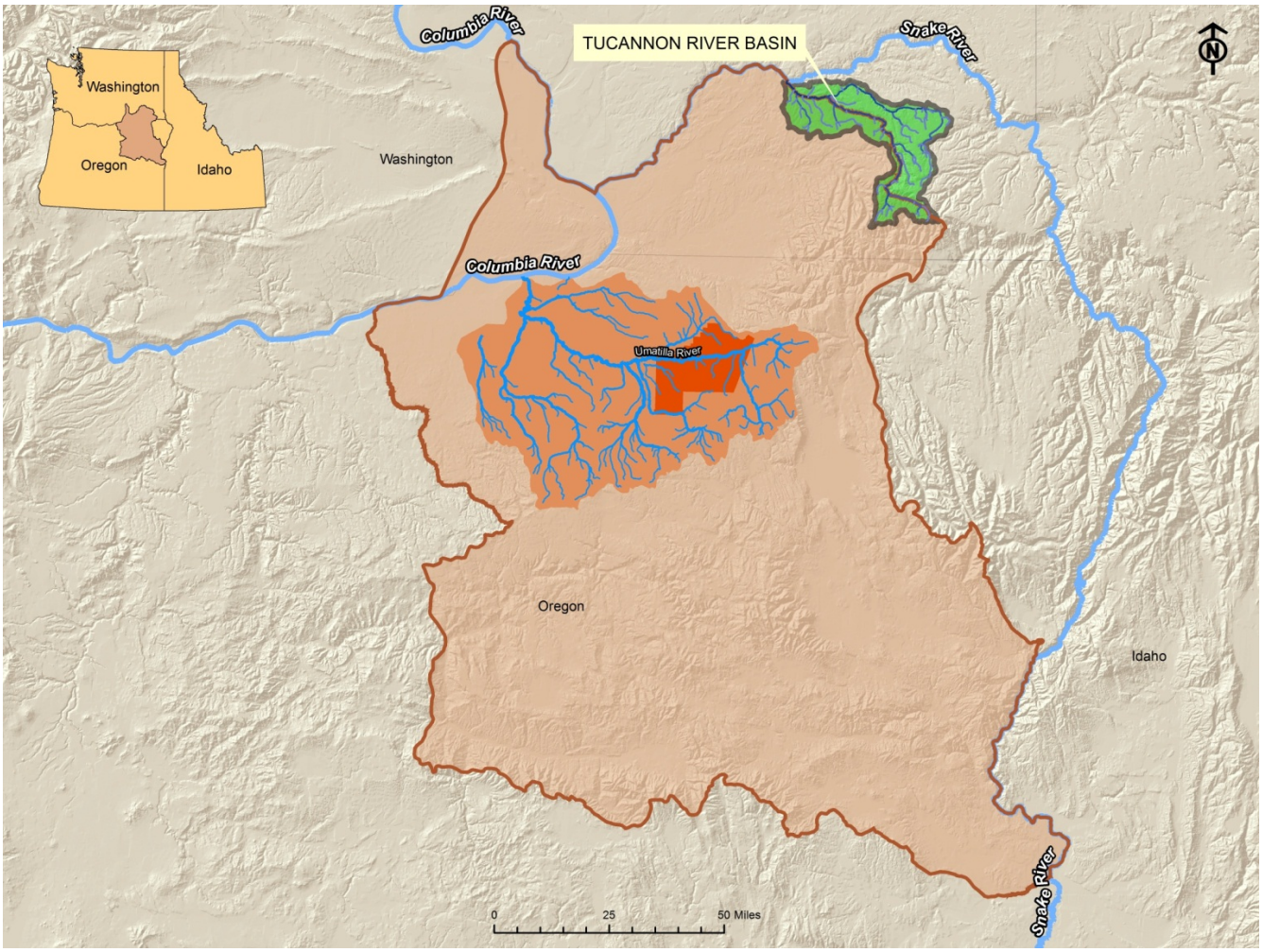

Figure . Tucannon River Watershed vicinity map showing proximity of the Tucannon Basin to the location of the Umatilla Indian Reservation located within the Umatilla basin as shown in red.

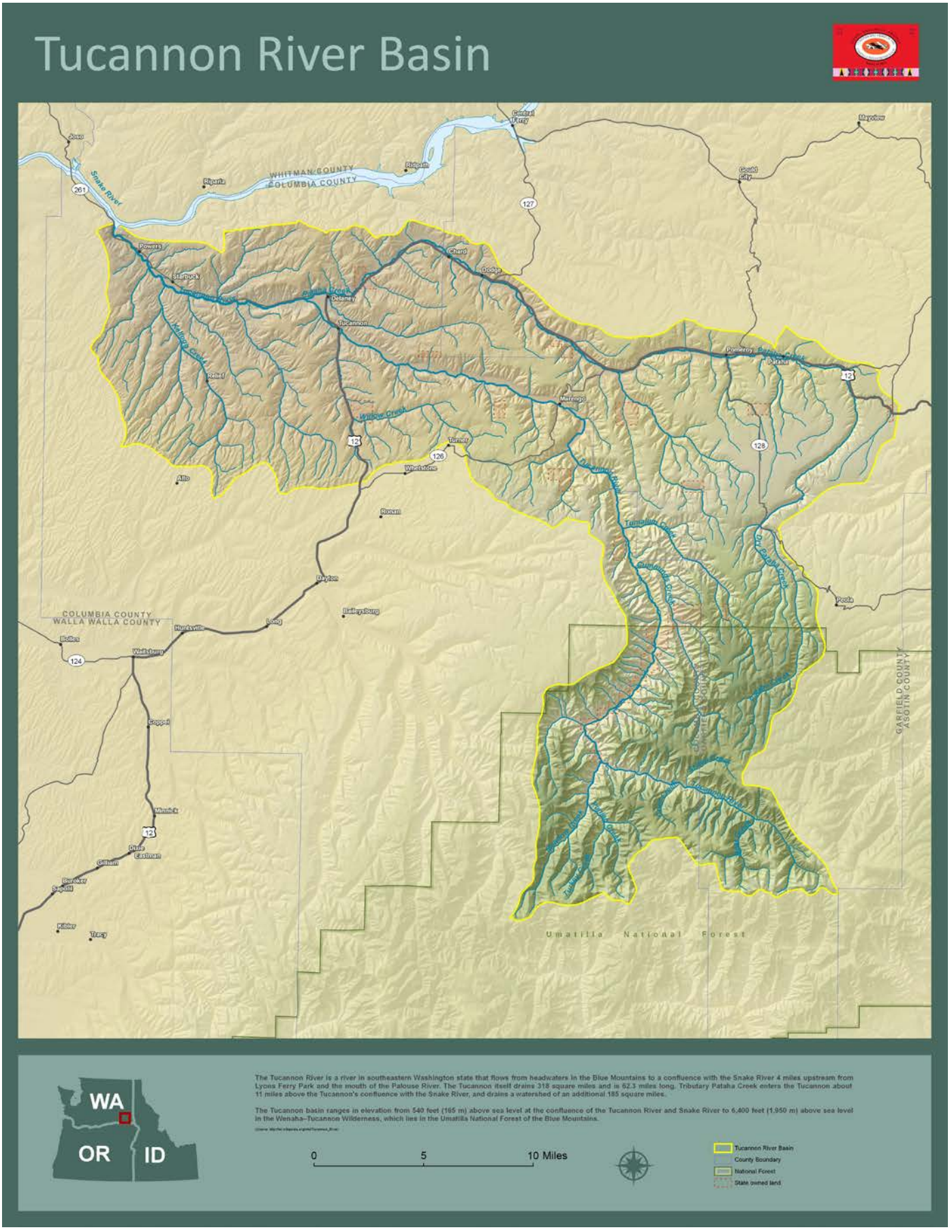

Figure . Map of Tucannon River Watershed topography.

REPORTING OF PROJECT ACTIONS BASED UPON STATEMENT OF WORK DELIVERABLES; DESCRIPTIONS AND RESULTS

Work elements and identifier codes assigned by the BPA Division of Fish and Wildlife as displayed in PISCES are presented in the following section. The work elements and milestone descriptions provide a comprehensive view of FY2009-2012 TFHP work activities.

27: Remove Debris

2009; 22 Car bodies and 1 20’ x 10’ waste container was filled with assorted metals extracted from the high water and riparian areas at Russel Springs Creek

Figure. Restoration of Russel Springs involved high degree of debris removal from riparian

29: Increase In-stream Habitat Complexity

Increase complexity of in-stream habitat features with natural materials.

2009; Russel Springs Creek, RM 0-0.3


Figure Pre project conditions


Figure Post project conditions


Actively Eroding Bank and High Terrace	ELJ Constructed to protect bank from eroding

	
Creation of contrasting attraction water	2 steelhead attracted to spawn in spring outlet

2010; Russel Springs Creek, RM 0.3-0.7


Figure Pre project conditions, plane bed form, straightened riffles

	
Riffle converted to sinuous riffle with pockets	Forced Straight scour pool

	
Conversion of glide to scour pool, reduced width	Edge effect habitat complexity created
	
Spawning gravel added produced annual redds	Forced meandering and lateral pools

	
Riffle converted to sinuous riffle with pockets	Forced Straight scour pool
	
Conversion of glide to scour pool, reduced width	Edge effect habitat complexity created

	
Spawning gravel added produced annual redds	Forced meandering and lateral pools

Figure Biological response to Physical habitat change

Figure Post project Conditions

2011; Hartsock Springs Creek

	

Figure Pre project conditions

	
Actively Eroding Bank and High Terrace	Mature Alder Provided Abundant Habitat Complexity

	
Spawning gravel added, steelhead use annually	Two years recovery time, vegetation response
	
Drive thru crossing eliminated, bridge installed	Pool and riffle sequence and undercut banks

Figure Hartsock post implementation

2012; Pataha Creek RM 1

	

Figure. Pataha Creek, RM 1, Illustration of pre-restoration condition.

De-watering strategy

300’ bypass pipe with all stream flow contained

Generator pump used to reduce groundwater seep

Stability methods for retaining LWD

Roughened channel complete, ready to re-water

Slow re-establishment of flow to seal channel

Figure Pataha Cr RM 1Implementation Methods

	
Actively Eroding Bank and High Terrace	Mature Alder Provided Abundant Habitat Complexity
	
Blackberries Provided Substantial Undercut	Large Wood Debris Accumulation
	
Natural Falls Classified as a Partial Fish Passage Barrier	Pool and Encroaching Hillslope and Formation of Lateral Pool

Figure Pataha Cr RM 1, Post restoration results

2012; Pataha Creek RM 10

Figure Pataha RM 10 pre project conditions

Actively Eroding Bank and High Terrace

Mature Alder Provided Abundant Habitat Complexity


Figure Pataha RM 10 Implementation methods


Actively Eroding Bank and High Terrace

Mature Alder Provided Abundant Habitat Complexity


Natural Falls Classified as a Partial Fish Passage Barrier

Pool and Encroaching Hillslope and Formation of Lateral Pool

Figure Pataha RM 10 post project conditions

2012; Tucannon River RM 44

Implementation by helicopter was chosen as the best available technique to reduce detrimental footprint and to retain critical length and complexity of whole trees. WDFW was the lead entity responsible for providing project management, and CTUIR identified as the primary project partner due to having the most experience partaking in this specific implementation strategy. . CTUIR provided technical review and input during the design process and field support prior to and during project construction. Implementation of PA 10 utilized a combination of constructed engineered log jams and unsecured log complexes. A total of 291 whole trees ranging in length

from 50 feet in length to over 100 feet and ranged in diameter from 15 inches to over 30 inches were added to the wetted channel via helicopter. Many were placed for the purpose of forcing pools or side channels. The stability of structures in the system is reliant on the size of trees placed; size was determined using the WDFW SHRUG guidelines developed in the Stream Restoration Manual. Additional trees and boulders were stacked in many locations to provide ballast to aid stability. Trees were transported from the US National Forest, approximately 3-6 miles to the project area and placed in stream using a S64 Sky Crane helicopter. Approximately 500 additional trees were transported to the project site ranging in size from 4-12 inches in diameter and 20-30 feet long and distributed throughout the project reach using the helicopter.

Figure . Clockwise illustration of pre-restoration condition, to post treatment complexity.
Figure 1.

47: Plant Vegetation

Planting tasks include site planning and development of planting strategies, collection and preparation of materials (pruning and conditioning of live whip material), pre-order coordination with the CTUIR native plant nursery (Figure 18), and installation. Planting techniques are customized for conditions within each project area. Planting location, species, age, form (cuttings, saplings, bare-roots, potted, plugs), and soil/substrate conditions were considered and addressed during the implementation planning phase.

Maintain Vegetation – Maintain Vegetation Plantings at All CTUIR Habitat Project Areas

Water & trim plantings. Pulled weeds to improve survival at CTUIR existing project areas, avoiding chemical use. Maintain structural integrity of riparian enclosure and livestock fencing at project sites. Supplement Riparian Areas of Existing and New Projects with Additional Vegetation. Establish vegetation in existing project areas where lacking. Plant vegetation in new project areas. Establish an agreement with the CTUIR Nursery to supply trees for assorted projects on demand.

	
Cutting live Willow stakes near project site	Willow stakes are kept at full length for planting
	
Salvaged cuttings soak during implementation	Full cuttings forced deep top reach ground water

	
Instant Re-establishment of riparian shade	Bare root stock supplemented cuttings

	
Salvage of mature willows with track hoe	Soaked then replanted as finishing detail at site
	
Utilization of sedge mats at spring site crossing	Instant reduction of width and increased velosity

Figure Vegetation planting strategies used at project sites

2009, 2010, 2011, 2012; CTUIR conducted planting projects at the stream sites shown in Table. The table shows the name of the water body, the location (river mile, [RM]), pounds (#) of seeds, and type and number of plantings per year at each site.

Table. FY2009-2012 Vegetation Plantings at Existing and New Projects

Water Body	RM	Pounds of Seed	Plantings
Russel Springs Creek	0.3	100	300 Willow, 200 Alder, 100 River Birch, 100 Elderberry, 100 Cottonwood.
Hartsock Springs Creek	0.5	100	500 Willow, 200 Alder, 200 River Birch.
Pataha Creek	1.0	500	500 Willow, 400 Alder, 200 River Birch.
Pataha Creek	10.0	300	300 Willow, 300 Alder, 100 River Birch.
TOTAL		**1,000**	**3,300**

85: Install Fish Passage Structure

Improve Fish Passage Conditions for ESA Listed salmonids
Install Fish Passage Structure: Install Roughened Channel Cunningham Sheep Company Culvert, West Birch Creek

Planning activities for this project were conducted and the project was successfully completed in November, 2009. The CTUIR used a "roughened channel strategy" to reestablish proper stream gradient and rectify passage. This technique functions like a rock weir, but with natural aesthetic value and abundant microhabitat for rainbow/steelhead trout. CTUIR sloped an eroding bank which was then seeded with native grass.
The fish passage barriers, This dam was preventing the migration of adult steelhead ascending upstream to optimal spawning areas and impeding the movement of fish seeking optimal rearing areas and/or cooler water refuge areas during the summer months.

The 261 culvert and Hwy 12 box culvert were recognized as the most significant passage impediment for migratory fishes in the Tucannon drainage-basin plan language. The road crossings had step-heights of 1-2 feet during low water periods. Approximately 37 miles of improved summer steelhead spawning and rearing habitat existed upstream from the dam but seasonal passage issues limited the abundance of salmonid distribution upstream. Selection of a roughened channel strategy was chosen for function and aesthetic value of the highly visible crossings. Step heights were reduced to less than .8 feet (<9.6") to comply with passage guidelines established by WDF.

Key objectives of the barrier rectification project include:

- Improve access for salmonids to stream headwater areas and cool water refuges
- Increase the quantity and quality of accessible salmonid habitat
- Approach historical free-flowing migratory corridor through passage improvement
- Approach natural stream slope, function and appearance
- Improve connectivity for populations of listed salmonid species to improve genetic exchange/integrity to improving fitness and long term survival capability
- Increased salmonid population dynamics and carrying capacity of preferred species
- Fulfill tasks identified in restoration plans by addressing limiting factors
- Improve survival rates by reducing stressors on salmonids
- Reduce impacts to various stream biota associated with structural passage barriers

De-watering strategy

300’ bypass pipe with all stream flow contained

Generator pump used to reduce groundwater seep

Stability methods for retaining LWD

Roughened channel complete, ready to re-water

Slow re-establishment of flow to seal channel

Figure Pataha Cr RM 1Implementation Methods

	
Actively Eroding Bank and High Terrace	Mature Alder Provided Abundant Habitat Complexity
	
Blackberries Provided Substantial Undercut	Large Wood Debris Accumulation
	
Natural Falls Classified as a Partial Fish Passage Barrier	Pool and Encroaching Hillslope and Formation of Lateral Pool

Figure Pataha Cr RM 1, Post restoration results

CTUIR was successful in securing agreements with two of three landowners, but needed 100% agreement to proceed. However, CTUIR did not secure agreements to extend restoration activities beyond the high water mark.

114: Identify and Select Projects

Conduct project solicitation and prioritize projects based on their merit and benefit to salmon recovery. Submit recommended projects to BPA. Provide technical support to project sponsors throughout implementation.

The consistency with natural geomorphic process criteria was also used. Natural geomorphic processes are the primary factor in creating and maintaining high quality habitat in properly functioning rivers and streams. Designing for geomorphic process or removing inhibitors to geomorphic processes are very important considerations in project prioritization. The sustainability and functionality of the project is highly dependent on consistency with geomorphic processes, and it is the restoration of these processes that will create and maintain habitat features in the long term. The projects that will effectively address the rehabilitation of natural processes received the highest qualitative rating. Consistency with natural geomorphic processes were evaluated within the following categories (1) removes stressors that promote habitat degradation or inhibit natural channel and floodplain processes, (2) promotes reach-scale geomorphic response consistent with natural processes, (3) promotes the retention of LWD and sediment and forces pool-riffle morphology and complex channel plan form.

The Programmatic supported the CCD's development of the Tucannon River Geomorphic Assessment and Habitat Restoration Study (Anchor April, 2011), and Conceptual Restoration Plan, Reaches 6 to 10 Tucannon River Phase II (Anchor April, 2012) and prioritized the 28 projects identified into a 6 year work plan (Attached to Pisces contract # 56233). The TCC and the RTT prioritize the 28 restoration projects identified in the Conceptual Restoration Plan (Anchor November, 2011) for available funding and estimated and identified matching funding from non-BPA sources over the first three years of the plan.

115: Produce Inventory or Assessment

Survey of habitat conditions in the Tucannon Basin
Development of a monitoring plan

Collect/Generate/Validate Field and Lab Data – Collect Various Forms of Professional, Scientific Data for Project Potential Analysis
A. Environmental compliance requirements complete.
B. Conduct annual photo point cross sections related to specified project areas.
C. Conduct photo documentation at 36 whole tree configuration sites, in Meacham Creek, various flows.
D. Do aquatic habitat inventory assessment survey of Isquulktpe Creek RM 0-10.
E. Do aquatic habitat inventory baseline at project areas prior to implementation.
F. Conduct fish inventory surveys in association with fish relocation prior to instream Work.
G. Perform riparian tree planting survival inventory at selected areas.
Deliverable: H. Develop and utilize applicable and effective monitoring techniques.

CTUIR independently collected pre-project data on the following: water temperature, aquatic habitat inventory, fish composition, abundance and spawning. CTUIR cooperatively participated in the collection of turbidity, aquatic insect composition and abundance. CTUIR counted steelhead spawning redds and collected carcass data in Creek in the spring of 2009. Spring redd data was collected. CTUIR also conducted habitat surveys on West Birch Creek at RM 2.7 and 3.2. A fish survey was conducted at RM 2.7. CTUIR also conducted a habitat and fish survey from RM 0-8 on Isquulktpe Creek in FY2008. Isquulktpe Creek is a tributary of moderate size of the Umatilla River and enters from the south at RM 76.7. The elevation at the confluence is 1640 ft.

Aquatic habitat methods developed by Oregon Department of Fish and Wildlife were used to inventory aquatic and riparian habitat on all creeks (Moore et al. 2002). Field surveys were conducted by one to two persons walking upstream, dividing the stream into a series of individual habitat quadrats. Quads were identified as riffle, rapid, glide, scour pool, off-channel/sub-unit pool, and numbered sequentially. Dimensions of quadrats were determined primarily on distinct hydraulic features as defined in the ODFW methods.

The following data was recorded for each quad; habitat type, latitude, longitude, mean length, wetted and high-flow width, depth, shade, canopy, wood rating, substrate composition, channel type, percent flow, land use, bank class, undercut bank, dominant and secondary vegetation. Blackberries and young deciduous growth were classified as shrub cover. Wood ratings were categorical and useful for quantifying the value of in-river woody debris habitat for fish. In addition, pieces of woody debris were tallied if they met minimum size requirements, and were located within the high water channel. Shade values were taken when standing in the middle of a qaudrat, while canopy estimates were made from each adjacent shoreline. Notes were taken to supplement the standard entry requirements.

Currently protocol within the CTUIR TFHP recommends that a pre-implementation fish inventory be conducted to establish baseline data including fish density and species composition. This protocol was established in order to obtain measurable results for our habitat enhancement work over time to determine the effectiveness of habitat enhancement actions. Fish surveys were conducted at three habitat enhancement project sites and are discussed below.

A crew of two to three persons were used when conducting fish surveys. One backpack electroshockers manufactured by Smith Root Inc. was used to sample fish at site locations previously inventoried for habitat. Navigating to the sites was assisted by global positioning satellite (GPS) technology.

Blocknets were used at the lower and upper ends to isolate each site. Care was taken not to displace fish from the section as nets were being set. A variety of unit-types with different physical characteristics were sampled to represent the habitat complexity within and between unit types. All species were targeted and captured with dip nets and removed on successive electrofishing passes. Electrofishers were operated in a similar manner for the same number of seconds (or slightly more) as the previous pass. Electroshocker settings (i.e., volts, pulse) remained constant for each removal pass.

Captured fish were temporarily held in buckets, and then placed in a flow-through livewell upstream from the uppermost blocknet. A portion of the fish were identified to species, measured and weighed. Differentiation between anadromous steelhead and resident rainbow trout could not be determined; therefore, all were classified as rainbow trout. After examination, fish were released back into the site where captured, or in some cases relocated just up or downstream from the sampled reach if conditions appeared significantly better.

Electrofishing crews sampled 4.4% of the total wetted stream bed area surveyed by the habitat crew. A total of 26, 201 salmonids were estimated within the study reach (RM 0-8). A comparable fish survey was conducted by CTUIR in 1994 and an estimated 25,698 salmonids were present within the same reach (RM 0-8). The overall density was estimated at 36.2 salmonids per $100m^2$. Appendix A provides specific details on habitat features and associated salmonids estimated within each habitat type.

During passage rectification and habitat enhancement projects, fish relocation operations conducted by CTUIR are authorized under various pre-existing permits which allow the capture and handling of listed fish species for scientific purposes. CTUIR has a very experienced and certified crew including an on-site project leader with 16 years of experience working with naturally produced Pacific Northwest salmonids. CTUIR uses well-maintained fish capturing gear and techniques that minimize impacts on fish health. Fish capturing crews use nets to make as many passes as necessary in attempt to remove 100% of the fish from the work sites.

119: Manage and Administer Projects – Produce Quarterly Status Reports to BPA Contracting Officer Technical Representative (COTR)

This work element includes a suite of management actions required to administer the project, including preparation of annual operations and maintenance budgets, managing and preparing statements of work (SOW) and budgets, and property inventory to the assigned BPA COTR. The project leader reports milestone and metrics to BPA using the BPA Pisces Program, supervises, trains, and directs staff activities, conducts vehicle and equipment maintenance and management, performs payroll, purchasing, subcontracting for services, and administers habitat enhancement activities.

2009-Setup satellite office at Walla Walla Community College
2009, 2010, 2011, 2012; Submitted property inventory to appropriate source using designated template.
2009, 2010, 2011, 2012; Produced Statement of Work with projected budget to COTR.
2009, 2010, 2011, 2012; CTUIR Administration submitted budget accrual estimate to BPA.
2009, 2010, 2011, 2012; Completed accurate quarterly status reports accepted by COTR.

W132: Produce Annual Progress Report – Submit Annual Report for the Period February 2008 to January 2009

A. Review annual progress report format requirements.
B. Submit annual progress report for internal contractor review.
C. Submit annual progress report for external review.
B. Confirm BPA has posted the progress report.
Deliverable: E. Attach 2008 Progress Report in Pisces.

CTUIR reviewed annual progress report requirements and submitted the report for internal review on December 31, 2008. By submission of this FY2008 Annual Report, CTUIR has fulfilled its contractual obligations to BPA by reporting the FY2008 project details for the period February 2008 to January 2009.

A. Submit progress report for external review.
B. Confirm BPA has posted the progress report.
Deliverable: C. Attach 2007 Progress Report in Pisces.

Annual reports provide updates on project progress on an annual basis and follow standard BPA formatting. CTUIR submitted the 2007 Annual Report on December 2, 2008. The report was reviewed and edited prior to submission to BPA. It was confirmed by BPA that it had been posted on the same date as an attachment. Thirty days later, it was posted to the PISCES website for public viewing. The URL for this report is: http://pisces.bpa.gov/release/documents/documentviewer.aspx?doc=P109208, as accessed on January 21, 2009.

162: Analyze/Interpret Data

Analyze/Interpret Scientific Data

A. Interpret suspended solids data collected for Meacham Creek via professional services subcontract.
B. Interpret redd & carcass data for salmon/steelhead redd data, Meacham & Birch Basins.
C. Interpret the applicability of aquatic benthic macroinvertebrate data collected on Meacham Creek.
Deliverable: D. Summarized data in the format of professional scientific reports.

Aquatic Habitat Inventory

The survey results were as follows: (1) 14% of the quadrats surveyed were dry, (2) wetted braided channels made up 20% of the stream length and 10% of stream area, (3) 45% of habitat

units was classified as riffle, (4) 45% of stream banks were actively eroding, (5) 1% of bank length was undercut, (7) open sky value of the wetted channel averaged 60%, (7) 1.6 pieces of large woody debris per 100 m (328.1 ft), (8) wood complexity score as fish cover averaged 1.2, (9) average stream gradient was 1.3%, (10) width of the wetted channel averaged 25 times the depth, (11) substrate was dominated by gravels (43%) and cobbles (40%) and 200 boulders (>20") per mile provided important cover and microhabitat for fish (CTUIR 1994). The maximum stream temperature was 74°F (23.3 °C).
The dimensions of sample-sites varied. Wetted channel widths ranged from 1.8-10.5 m (5.9-34.4 ft) wide and lengths were 177-313 m (581-1027 ft). There were 135 pieces (12.3 mean per site) of wood tallied that met size and location criteria. A good portion of the woody debris either lacked complexity or was located beyond the wetted channel where it was of little value to fish at the time of survey. Hence, the wood rating as it pertained to fish cover ranked only 2.0. This phenomenon was the direct result of the flashy flow nature of the system as supported by active channel widths measuring 7.4 times as wide as wetted widths.

The average values per sample-site for bed scour, spawning fines, and embeddedness were 4.6, 2.1 and 2.1, respectively. The results indicated very high bed scour with moderate to low amounts of fine substrate in potential spawning areas. Generally, these values met criteria associated with moderately favorable spawning conditions. Undercut values averaged only 10.5% per quadrat sampled, which indicated a low quantity of overhead cover, essential for providing shading and hiding areas for fish.

There were intermittent concentrations of mature tree growth in the riparian area that received solid habitat rankings, but generally the distance from the wetted channel was too great to provide adequate shading or the width of the riparian strip was rather thin, and flanked by cleared land. Hence, average channel shade values were 37 degrees (angle of shade provided by riparian trees or landforms). Riparian canopy closure values averaged 33%. The overall habitat quality of Meacham Creek (RM 0-15.3) using ODFW ranking criteria was "poor".
Collect/Generate/Validate Field and Lab Data

In April 2010, the CCD acquired a LIDAR and orthographic image data set for the Tucannon River valley floor from its confluence with the Snake River upstream to RM 50 and CTUIR funded an additional 10 miles to the headwaters. The LIDAR dataset was used to determine area of connected and disconnected low-lying floodplain, potential side channels and riparian enhancement opportunities for RM 20 to RM 50, data is provided in Anchor (November 2011, Table 3). River channel confinement in the Tucannon River was found to be approximately 80% (40 miles) of the total 50 miles surveyed as part of the Tucannon River Assessment (Anchor April 2011). The Tucannon River has been impacted by confinement greater than was initially estimated from earlier available data. The restoration objectives outlined in the restoration plan (Table 1) recommend reducing channel confinement to a maximum of 25%-50% confined. When the maximum confinement range is applied to the data provided in Anchor (November 2011 (Table 4) the restoration goal for confinement equals 23.1 miles of habitat restoration needed to reach 75% unconfined.

Through the work completed in the Tucannon River Assessment (Anchor April, 2011), restoration planning and conceptual design (Anchor November, 2011), the upper 30 miles of river habitat was measured for LWD presence or absence. The river reaches not meeting the LWD objective for restoration of 1 key piece per channel width were noted and a total of 21 miles of the 30 miles surveyed did not meet the objective (Table 1). It is estimated to achieve the restoration objective set for the Tucannon a minimum of 2,200 LWD key pieces will need to be placed throughout the upper 30 miles of river. In 2012, through the implementation of Project Area 10 a total of 300 pieces of LWD were place on 1.5 miles which meets the LWD objective of >1piece/bank width. The wood placed on Project Area 10 project totaled 7.14% of the total objective for improving Tucannon large woody debris by length.

Fish Surveys

Biological Surveys of Meacham Creek RM 0-15.3 were conducted in June 1993 for determining density of juvenile salmonids. The number of juvenile salmonids estimated in the lower 15.3 miles was 71,924 naturally produced rainbow/steelhead juveniles, 1,017 hatchery produced steelhead, and 361 juvenile spring chinook salmon.

Mean density of rainbow/steelhead in the lower 15.3 miles of Meacham Creek was estimated as 20 fish per 100 m^2. Comparatively, salmonid densities on the mainstem Umatilla River within the boundary of the Umatilla Indian Reservation (RM 56.1-81.8) were only 3.6 per 100 m^2 (1075 ft^2) whereas densities in the Meacham Creek Watershed average 20-35 /100 m^2. There were nearly 2.5 times as many salmonids in the 15.3 miles of Meacham Creek surveyed that in the lower 81.8 miles of the Umatilla River, despite the fact that Meacham Creek has considerably less water volume than the Umatilla River. Estimated densities of rainbow/steelhead in the main tributaries of Meacham Creek were 2-4 times higher than in the mainstem of Meacham Creek. These metrics illustrates the importance of the Meacham Creek Watershed in terms of salmonid production and potential.
A fish salvage operation was conducted in July 2008 on the lower 0.5 miles of Isquulktpe Creek. Salvaging is necessary because the channel annually becomes devoid of flows in this area due to extensive human disturbance of its lower reach, primarily caused by the presence of the railway and paved road. Two-day rescue total counts of juvenile salmonids were as follows: 1075 rainbow/steelhead trout, 5 spring chinook salmon, 3 coho salmon, and 1 bull trout. Other quantities of species relocated were 50 sculpin *spp*. and 7 pacific lamprey juveniles. Fish captured were relocated to adjacent areas of the creek where summer flows were known to persist. Within a week of the salvage effort, the entire half mile reach became dry. Salvaging should be a planned action every summer at this reach until habitat conditions are improved enough to sustain persistent flows throughout the summer period.

165: Complete Environmental Consultation Processes
Produce Environmental Documentation-Prepare Biological Assessments for Applicable Projects; Submit JPA to State and Federal Entities; Cultural Resource Protection and Preservation
CTUIR successfully submitted all applicable and required permitting documents to the appropriate federal, tribal, state, county entities for select implementation projects in a timely

manner. Secondary environmental compliance accomplishments during the reporting period included coordination with various compliance personnel to prepare supplemental documentation and reporting for ongoing and planned management actions.

Specifically, CTUIR

- Prepared two biological assessments (BA) that covered all Meacham Creek and Birch Creek passage barrier rectification projects
- Prepared and submitted Joint Permit Applications to the US Army Corps of Engineers (USACE) and Oregon Department of State Lands (DSL) for the Meacham Creek and Birch Creek passage rectification projects.
- Obtained cultural resource survey/reports for the Birch Creek and Meacham Creek passage projects and obtained cultural resource preservation clearances.

Environmental compliance methods include development of appropriate documentation under various federal, Tribal, state and county laws and regulations governing federally funded project work. Methods involve coordination with various federal and state entities agencies and development and submittal of permit applications, cultural clearances, BAs, National Environmental Policy Act checklists, etc., as necessary. Part of the environmental compliance work element includes planning and developing site-specific proposals tailored to accomplish fisheries goals and meet compliance standards. The details concerning the implementation of treatments and preparations for putting efforts on the ground, including preparations for subcontracting, and specifics in regarding the safeguarding of ESA-Listed species during the implementation process, are outlined in the proposals.

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174: Produce Plan

Design and/or Specifications – MOA Increased Quantity of Project Designs

185: Produce Pisces Status Reports and Periodic Status Reports for BPA

A. Feb-Mar 2008 (2/1/2008 - 3/31/2008) - Completed
B. Apr-Jun 2008 (4/1/2008 - 6/30/2008) - Completed
C. Jul-Sep 2008 (7/1/2008 - 9/30/2008) - Completed
D. Oct-Dec 2008 (10/1/2008 - 12/31/2008) - Completed
E. Final Jan 2009 (1/1/2009 - 1/31/2009) - Completed

Quarterly Pisces reports were prepared, reviewed, and accepted by the BPA project COTR. These reports provide a regular update on project progress on status of work elements and associated milestones to allow adaptive management.

191: Watershed Coordination

Coordinate habitat restoration with other entities to enable joint planning and participation in habitat enhancement projects. Formation and active participation of natural resource management forums as effective relationships are forged with cooperating entities toward achieving common goals.
Public Outreach/Education

Project Leader also functions as an instructor at WWCC, teaching Watershed Process & Restoration 239. Content is comprised of restoration actions through CTUIR employment. College students are used as volunteers as well as paid technicians to improve appearance and function of BPA funded restoration projects in the Tucannon Basin. WWCC Career Day work associated with natural resources professions.
Conducted multiple project tours, to showcase Habitat Program accomplishments.

coordinating and hosting public and private tours participating in the development of a salmon restoration video clip at Pataha 261.
Regional Coordination With Other Agencies in Planning and Implementing Habitat Improvements
A. Participate in Soil and Water Conservation District meetings and interact with stakeholders.
B. Participate in Umatilla Basin Watershed Council meetings and interact with stakeholders.
C. Coordinate with Umatilla Basin co-managers Oregon Department of Fish and Wildlife.
D. Network with professional experts in the discipline of habitat restoration.
Deliverable: E. Active participation with co-managerial interests in the Umatilla Basin.

Coordination with other agencies in planning and implementing habitat improvements in the basin is undertaken to facilitate development of habitat restoration and enhancement projects, participate in Subbasin, ESA planning processes and project selection processes, and assist with providing watershed restoration education. In FY2008, CTUIR actively participated in constructive interactions with the ODFW, UBWC, NRCS, Farm Services Agency (FSA), and Umatilla County Soil and Water Conservation District to utilize networking structures and increase cooperative partnerships to strengthen project effectiveness. CTUIR conducted post-implementation tours of the West Birch Creek RM 2.7 (Figure 11) passage rectification project and riparian fencing project at RM 3.0. In addition, CTUIR toured the Meacham Creek Levee

Setback Project in October 2008 with cooperating landowners and consultation entities. This contributed to the initial planning phase of the levee setback. CTUIR prioritizes regional coordination and encourages frequent cooperative efforts with its project partners.

Eric Hoverson presented a poster at the 2009 Western Division American Fisheries Society Annual Meeting, Portland, Oregon (Figure). Entitled "Strategies for Improving Fisheries Habitat in a Snake River Tributary: A One Year Perspective and Illustration of Diverse Techniques Used to Address Habitat Deficiencies in the Tucannon River basin." the presentation provided an overview of habitat enhancement and restoration activities and highlighted several large-scale projects undertaken by the CTUIR and project partners. The poster was invaluable for networking with other colleagues for future projects and for sharing our current work. Habitat restoration conferences and professional tours.

2009, 2010; Initiated cooperative agreement process with WDF.
2010; Investigated potential cooperatives with the Nez Perce Tribe (NPT) and the USFS.
CTUIR formed the Tucannon Coordination Committee.
2011; Established cooperative partner relationship and implemented with NPT and USFS.
2012; Strengthened partnership with USFS as primary project partner in planning process.

CONCLUSIONS

The CTUIR TAFHP completed eight primary habitat enhancement projects and several additional adaptive management and monitoring projects in the Umatilla River Basin. Extensive aquatic habitat inventories and fish surveys were conducted at various project areas. Maintenance work continued at 27 pre-existing long-term easements with 23 landowners. Major project highlights included implementation of a fish passage rectification project, planting 10,000 saplings and cuttings, seeding 3,225 pounds of native grass, installing 3.3 miles of riparian fencing, and donating 1000 ft of riparian fence and 1208 fence posts and associated hardware for livestock exclusion and to protect trees from beaver damage. We designed and installed two solar-powered off channel water developments to exclude livestock from the riparian zone.

A principal strength and focus of the CTUIR TFHP project is the ability to work cooperatively with the various entities throughout the restoration process. This was demonstrated by CTUIR's donations of fencing and riparian plants to project partners USFS, NPT, WDF. Strong partnerships increase the magnitude and frequency of success and often facilitate additional project opportunities. Professional and effective networking efforts provide opportunities to recruit specialized experts in the profession to jointly develop project strategies to strengthen the result of restoration and enhancement actions.

The CTUIR is emphasizing more attention toward project planning in regard to developing a systematic approach for site selection based on scientific data as well as to increase efforts towards effectiveness monitoring (both have been considered as shortfalls in the past from review committees). The new CTUIR philosophy emphasizes adaptive management as a means of maximizing success at each project site.

The TFHP project provides technical assistance to other entities to assist in the development of associated projects. The CTUIR TFHP program will continue to work with project partners in the basin, to achieve successful improvements in watershed conditions, and facilitate recovery of ESA-Listed fish stocks by accomplishing unprecedented quantity and quality of results.

The CTUIR TFHP hypothesizes that both ecological and physical forces currently limit salmonid production in the Umatilla River Basin and that the relationship between physical habitat conditions, ecological conditions, and salmonid abundance will improve in sites that receive habitat treatments. This is demonstrated by measured improvements in the physical habitat condition of Creek (RM 0-8) which has resulted in an increased abundance of salmonid populations. Post-treatment monitoring is an important component of the habitat restoration process and is vital towards determining measurable results of restoration actions and identifying trigger-mechanisms responsible for instigating positive change. Project success is ultimately determined by technique applicability, accurate implementation, effective monitoring and timely adaptive management. The CTUIR TFHP is recognized as experts in the discipline of fish habitat restoration in this geographic region and strives to maintain this status.

Recognition of the unique characteristics of each project site should be considered in conjunction with landowner parameters when selecting the most effective, site-specific habitat restoration plan. A plethora of management strategies have been successfully applied in effort to reestablish the salmonids to self-sustaining levels. We expect exponential response of salmonid populations once habitat deficiencies are addressed and improved. We believe a positive correlation between habitat improvement, salmonid density, and fitness levels will shift the status of ESA-Listed species towards a safer level of sustainability in the Tucannon River Basin.

Citations

2012 Anchor QEA, LLC. Integrated Species Restoration Prioritization Tucannon River. Prepared for the Columbia Conservation District and Snake River Salmon Recovery Board, Dayton WA. Anchor QEA Bellingham, WA November 2012.

2011 April, Anchor QEA, LLC. Tucannon River Geomorphic Assessment and Habitat Restoration Study. Prepared for Columbia Conservation District, Dayton WA. By Anchor QEA Bellingham WA.

2011 November, Anchor QEA, LLC. Conceptual Restoration Plan, Reach 6 To 10 Tucannon River Phase II. Prepared for Columbia Conservation District, Dayton WA. By Anchor QEA Bellingham WA.